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No II.

AN IMPROVED ENGINE FOR TRAMMING SILK.

The SILVER VULCAN MEDAL *was this Session presented to Mr.* W. V SHENTON, *of Winchester, for an* IMPROVED ENGINE FOR TRAMMING SILK, *a Model of which is placed in the Society's Repository.*

THE only preparation which the raw silk imported into this country has previously undergone, is that of being wound off the coccoons; but as the filament of the silk-worm is of extreme tenuity, it is necessary, in the winding, to conjoin the filaments of from five to seven coccoons, in order to obtain a single thread of the requisite staple. The raw silk, thus composed, is still, however, too slender for the purposes of manufacture; and, accordingly, the first process which it undergoes is that of uniting two, three, or four threads into one, previously to giving it that kind of twist which is technically termed organzining.

The machine by which the union of the required number of threads is effected is denominated a tramming engine, and admits of a considerable variety of structure, but the conditions absolutely essential in all are the following: first, that the silk may pass off easily, and without entangling, from the delivering bobbins; secondly, that a small and equal degree of tension be applied to the threads, as they pass from the delivering bobbins to the receiving one, so that the compound thread shall be perfectly even, which obviously would not be the case if one of the component threads were quite loose while the others were drawn straight; thirdly, that the receiving bobbin cease to revolve as soon as any one of the component threads happen to break, an accident which not unfrequently occurs, as, without such contrivance, a thread would be produced of variable thickness, from the casual omission of one or more of the component threads.

The operation of tramming, in some of the best constructed mills, is performed in the following manner:—

The delivering bobbins (varying in number from two to four, according to the intended thickness of the compound thread) are placed upon as many vertical spindles, the vertical position allowing the threads to quit the bobbins without any motion or revolution of the bobbins themselves. Some way above the bobbins the threads pass singly between two horizontal slips of cloth or felt, which, by their friction, give at the same time a certain degree of tension to the threads, and clear them from any dust or other light matter. Each thread then passes through the eye of its own drop-wire, whence they all converge and unite in the eye of the *guider*, from which the compound thread is distributed on the surface of the receiving bobbin as it revolves. Each drop-wire consists of a piece of wire turned up so as to form a right angle, of which the vertical leg is about two inches long, and is terminated by an eye, through which the thread passes, and the horizontal leg is about four inches long, terminating likewise in an eye, through which passes a pin, connecting all the four drop-wires, and forming a pivot on which each is capable of moving freely. Each thread, in passing through the eye of its drop-wire, slips down a little, and being in a state of moderate tension, supports it at the elevation of half an inch or more above the position to which it would otherwise descend. When, therefore, a thread breaks, its drop-wire immediately falls and strikes on the edge of a wire frame moving on a horizontal pivot, and so adjusted that the weight of the drop-wire immediately inclines downwards that side which it touches, and, consequently, raises the opposite side. To this opposite side a tail of wire is attached, which, when raised, catches on a kind of ratchet-wheel fixed on the same spindle as the receiving bobbin, and, consequently, stops it. The broken thread being repaired, is again passed through the eye of the drop-wire and supports it above the frame; the opposite end of the frame then becomes preponderant, the tail or stop descends out of the way of the ratchet-wheel, and the revolution of the receiving bobbin immediately re-commences.

This apparatus is very simple and efficacious, but is liable to two inconveniences; first, that the thread usually breaks close to the pieces of cloth by which it is compressed, and some trouble and loss of time are occasioned in drawing the thread out previous to tying it; secondly, that when a smaller number of threads than four are trammed, the vacant drop-wires must be removed, otherwise, their unsupported weight would, as above described, throw up the stop, and prevent the revolution of the receiving bobbin.

The contrivance by which Mr. Shenton effects the operation of tramming, and avoids the above-mentioned inconveniences, will be evident by referring to plate VIII, of which

Fig. 1, is an end view, and fig. 2 a bird's-eye view of his machine, the same letters of reference denoting the same parts in all the figures.

a a, the axis which gives motion to the receiving bobbins, *f f*, by means of wooden rollers, *d d*: they are made of any required length, to suit a continued series of succeeding bobbins, with a roller under each: the wooden axis which carries the receiving bobbin has a leaden roller, *e*, fixed on it, which receives motion by mere contact, on account of its weight. This axis is shown separate in fig. 3. *p p* are two pins fixed in the leaden roller *e*; *s*, another pin, or hook, which holds on the bobbin by hooking under the staple, *t*, of the bobbin, figs. 3 and 4; as the receiving bobbin revolves, it draws the threads from two, three, or four bobbin *g g g g*, as previously determined, and, in order to lessen the friction of these bobbins, which are fitted on wooden pins, *u u u u*, the pins are perforated, and ride upon a wire, *v*, and the bottom of these pins, and the loops which hold the wires, are rounded, leaving just friction enough to keep the threads extended: they are shown separate in fig. 5. Now, should any one of these threads break, it is requisite that the receiving bobbin should immediately stop; for this purpose, a crank wire, *m*, with a catch, *n*, and a fixed crank, *o*, is placed near each roller; on this four light drop-wires, *k k k k*, swing freely, and they have eyes to hang on the threads, which are their only support (these wires are shown a quarter their real size in fig. 6); now, should either of the threads break, the drop-wire which hung on it would fall on the crank, *o*, and cause the wire, *m*, to revolve, and bring the catch, *n*, forwards from its position, fig. 8, to lay hold of the pin, *p*, of the roller, *e*, as shown in fig. 7, and stop it immediately; then, as soon as the thread is mended, the thumb is laid on the tails, *w*, of the drop-wires, to bring up the fallen one; the thread is then put in the eye and the catch is withdrawn by turning back the end *m*, of the crank wire, and the work goes on; there are two spare notches, *x x*, to lay the bobbin in while joining the thread, that it may be out of gear and move freely till set right by hand. Now the silk threads, on leaving the bobbins, *g g g g*, pass separately over a glass rod, *i*, and through the eyes of the drop-wires, and then gather together in passing through the eye of the guide wire, *b*. In order to distribute equally over the bobbins the silk threads thus gathered together, an alternating motion is given to the sliding bar, *c c*, which carries the guide wires, *l*, by means of a pin, *r*, working in an oblique or spiral groove in the block, *b*, fixed on the end of the axis, *a*, and the obliquity of this groove corresponds with the length the silk is to be distributed on the bobbin, and, therefore, causes the sliding bar to move to and fro that length every turn of the wooden roller, or every four turns of the bobbin, the bobbin rollers being one quarter the size of the wooden rollers, *d d*.

The bars, *h h h h*, which support the supplying bobbins, are so placed as to make the bobbins stand at right angles with the thread, when it passes from their middle to the glass rod.

It is best to make the four eyes of the drop wires lie parallel to the glass rod, as their vibrations on the threads will be more equal.

Figs. 8 and 9 show the tinned iron facings which are coiled round under the bars at *y* to support the crank wire.

Fig. 10 shows how the guide wires are bent and fixed in the sliding bar.

q q, fig. 2, are two sliding wires; it will be seen that where four threads are tramming, it is drawn back, but where two threads are tramming, it is pushed in to support the two drop-wires that are out of use, and prevent their acting on the crank wire.

Fig. 11 shows the manner of riveting the wooden-rollers on the axis, by cutting up a burr with a chisel, on the angles *z z*. Figs. 1 and 2 are a guard rail.

Figs. 1 and 2 are one-sixth, the others one-fourth the real size.